

AMENDMENTS

In the Claims

1. (currently amended) A photovoltaic device for concentrating sunlight to multiple photovoltaic ~~[[photo voltaic]]~~ cells comprising:

5 a metallic bottom structure having ~~[[layer with]]~~ a multiplicity of indentations, at least a plurality of indentations containing a photovoltaic ~~[[photo voltaic]]~~ cell; and

a rigid ~~[[transparent]]~~ top structure ~~[[layer]]~~ containing multiple optical devices, the top structure aligned to the bottom structure such that the optical devices are positioned over at least one indentation in the metallic bottom structure ~~[[layer]]~~ at a distance no greater than 20

10 millimeters, wherein the optical devices concentrate incident sunlight towards each of the photovoltaic cells ~~[[cell]]~~ and the rigid top structure provides enough mechanical strength, rigidity, and stability to permit the photovoltaic device to be positioned.

2. (withdrawn) A system for locally concentrating sunlight onto a layer of multiple miniaturized photovoltaic cells that can operate independently on a stand-alone basis,

15 comprising:

a metallic bottom layer containing multiple bottom sections, wherein a majority of the multiple bottom sections are concentrator sections that contain a photovoltaic cell, and a minority of the multiple bottom sections are control sections;

a transparent top layer containing multiple top sections, each top section corresponds to a
20 bottom section in the metallic bottom layer, wherein each section of the top layer corresponding to one of the majority bottom sections of the metallic bottom layer contains an optical device positioned over the metallic bottom layer, with each of the optical devices concentrating the incident sunlight onto one of the photovoltaic devices.

3. (withdrawn) A miniaturized photovoltaic cell comprising means for confinement of
25 hole-electron pairs to prevent diffusion to an edge of a semiconductor material.

4. (new) A thin flat photovoltaic device for concentrating sunlight to multiple photovoltaic cells comprising:

a bottom structure having a bottom layer and a plurality of photovoltaic cells, the bottom layer configured for maintaining the photovoltaic cells to accept sunlight;

a top structure having a plurality of optical lenses, the top structure coupled with the bottom structure, and each optical lens positioned to concentrate incident sunlight towards at least one of the photovoltaic cells, wherein the plurality of optical lenses concentrate incident sunlight towards individual of photovoltaic cells, wherein the total device thickness of the photovoltaic device is less than 20 mm, the device thickness being measured from a top side of the top structure that is exposed to incident sunlight to a bottom side of the bottom structure that is distal from the top structure; and

means to move the bottom structure and top structure in relation to a light energy source, wherein the relative mechanical orientation between the top structure and the bottom structure is substantially invariant.

5. (new) The device of claim 4, wherein the power dissipation in each photovoltaic cell is less than 1 watt.

6. (new) The device of claim 4, wherein more than 50% of the incident solar energy is concentrated by at least one optical lens within a spot of less than 200 microns diameter onto at least one photovoltaic cell.

7. (new) The device of claim 4, wherein the temperature of the bottom layer is uniform to within 20 degrees Centigrade.

8. (new) The device of claim 4, wherein at least one of the plurality of optical lenses concentrates sunlight onto an individual photovoltaic cell and where at least one other optical lens concentrates less sunlight onto another photovoltaic cell.

9. (new) The device of claim 4, wherein the photovoltaic device is hermetically sealed.

10. (new) The device of claim 9, wherein the photovoltaic device comprises enclosed a gaseous volume.

11. The device of claim 9, wherein the photovoltaic device comprises enclosed a vacuum volume.

12. (new) The device of claim 4, wherein at least one photovoltaic cell comprises means for reducing the re-combination of hole-electron pairs within the at least one photovoltaic cell.